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P3.085 Radiative neutrino mass model with a TeV scale $U(1)$ gauge symmetry

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The radiative neutrino mass model can relate neutrino masses and dark matter at TeV regions. If we consider thermal leptogenesis due to resonant effect at that scale, both finely degenerate masses for the right-handed neutrinos and a tiny neutrino Yukawa coupling are required. We propose an extension of the model with a $U(1)$ gauge symmetry, in which these conditions are simultaneously realized through the symmetry breaking at TeV regions. This extension can bring about a small quartic scalar coupling between the Higgs doublet scalar and an inert doublet scalar, which characterizes the radiative neutrino mass generation. It is also the origin of the Z_2 symmetry which guarantees the stability of dark matter. Several assumptions which are independently supposed in the original model are closely connected through this extension.